



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

fw

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,062	06/27/2003	Sridharan Venk	K35A1309	6852
35219	7590	03/07/2006	EXAMINER	
WESTERN DIGITAL TECHNOLOGIES, INC.			CHEN, TIANJIE	
ATTN: SANDRA GENUA			ART UNIT	PAPER NUMBER
20511 LAKE FOREST DR.				
E-118G			2656	
LAKE FOREST, CA 92630			DATE MAILED: 03/07/2006	

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/609,062	VENK, SRIDHARAN
	Examiner	Art Unit
	Tianjie Chen	2656

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 27 December 2005.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-20 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application (PTO-152)

6) Other: _____.

2nd Non-Final Rejection

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 7-10, 14-17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (US 6,025,988) in view of Feigenbaum et al (US 6,434,817).

Claims 1, 8, and 15; Yan shows a flex circuit assembly, in Fig. 2 for use in a head stack assembly (FIG. 15) for used in a disk drive including: a disk drive base; and a head stack assembly rotatably coupled to the disk drive base, the head stack assembly including: a rotary actuator 92 (Fig. 15); and a flex circuit assembly attached to the rotary actuator; the flex circuit assembly 14 (Fig. 2, column 4, line 43) including: a flex circuit base film (flexible substrate tape, see column 5, line 6-7); an integrated circuit device 44 (Column 5, line 22) disposed adjacent the flex circuit base film and including a solder bump connection (Fig. 4); an electrically conductive trace 26 (Fig. 1; column 4, line 52) disposed upon the flex circuit base film, the trace including a contact pad (Fig. 4), the contact pad electrically connected to the solder bump connection.

Feigenbaum et al a method of attaching a circuit device 11 (Fig. 4, column 25, lines 2-3) to a flex circuit 13 (Column 6, line 63) wherein an underfill portion 19

(Column 7, line 62) disposed between the flex circuit base film and the integrated circuit device for attaching the integrated circuit device to the flex circuit base film, the underfill portion being formed of an underfill material epoxy (Column 7, line 64); and a glob top portion 22 (Column 8, line 29) disposed upon the underfill portion and the flex circuit base film for sealing the electrically conductive trace, the glob top portion being formed of a glob top material Hysol FP4544, which is different than the underfill material. Feigenbaum et al further teaches that underfill would provide a physical barrier so as to inhibit undesirable contamination (Column 7, line 63-66) and the glob top would provide a degree of mechanical protection and tend to hold the integrated circuit in place upon the flexible circuit (Column 8, line 38-41). It would have been obvious at the time the invention was made that one of ordinary skill in the art would have been motivated to use the underfill and glob top taught by Feigenbaum et al to prevent contamination and better hold the integrated circuit.

Claims 2, 9, and 16; in the above constructed device, the underfill material is a no-flow encapsulant after cured.

Claims 3, 10, and 17; in the above constructed device, the underfill material is a capillary flow encapsulate (Column 3, lines 6-9).

Claims 7, 14, and 21; in above constructed device, underfill portion is made of epoxy, which inherits a coefficient of thermal expansion of $5.4 \text{ cm/cm/}^{\circ}\text{C} \times 10^{-5}$, which is greater than inherited coefficient of thermal expansion of Hysol 4544 of the glob top, which inherits thermal expansion coefficient of $4.5 \text{ cm/cm/}^{\circ}\text{C} \times 10^{-5}$.

Art Unit: 2656

3. Claims 6, 13, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan in view of Feigenbaum et al as applied to claim 1, further in view of Barber (US 5,895,968) and De Bastiani (US 6,395,121).

Claims 6, 13, and 20; Feigenbaum shows that the underfill is made of epoxy (Column 1, lines 44-47) having thermal coefficient of $5.4 \text{ cm/cm/}^{\circ}\text{C} \times 10^{-5}$, but does not show the material for the integrated circuit and flex base film. Barber shows that the integrated circuit has packing material of glass reinforced epoxy, the web report (attached before) shows it has thermal coefficient of $3.6 \text{ cm/cm/}^{\circ}\text{C} \times 10^{-5}$, and De Bastiani shows that the flex base film is made of nylon (Column 1, lines 51-55), and Web report shows that it has thermal coefficient of $8.1 \text{ cm/cm/}^{\circ}\text{C} \times 10^{-5}$. Both materials are commonly used in the art for integrated circuits and flex base film. One of ordinary skill in the art would have been reasonably expect that the integrated circuit in Yan's device is made of glass reinforced epoxy and the flex base film is made of nylon; wherein the underfill has a coefficient of thermal expansion between coefficient of thermal expansion of the integrated circuit device and the flex circuit base film.

4. Claims 4, 5, 11, 12, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan in view of Feigenbaum et al as applied to claim 1, further in view of AAPA

Claims 4, 11, and 18; AAPA shows a flex circuit cover film disposed upon the flex circuit base film, the flex circuit cover film includes an opening, the integrated circuit device and the electrically conductive trace are disposed within the opening. It is notorious and common practice in the art. One of ordinary skill in the art would

Art Unit: 2656

have been motivated to expect that Yan and Feigenbaum et al has applied same structure in their device.

Claims 5, 12, and 19; AAPA shows that the under fill portion and next applied material for covering are both disposed in the opening ([007]). In the above, constructed device, the next applied material is the glob top material. It is notorious and common practice in the art. One of ordinary skill in the art would have been motivated to expect that Yan and Feigenbaum et al has applied same structure in their device.

Response to Arguments

5. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record in PTO-892 Form and not relied upon is considered pertinent to applicant's disclosure.

Web search report II attached shows that indicates: Hysol FP4544 has a coefficient of thermal expansion of 4.5 cm/cm/°C X 10⁻⁵.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is 571-272-7570. The examiner can normally be reached on 8:00 – 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2656

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



A handwritten signature in black ink, appearing to read "Chen Tianjie".

TIANJIE CHEN
PRIMARY EXAMINER